

TRIETHYLAMINE

Triethylamine is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 121-44-8

(C₂H₅)₃N

Molecular Formula: C₆H₁₅N

Triethylamine is a colorless liquid with a strong ammoniacal odor. It is slightly soluble in water above 18.7 °C, and miscible with alcohol, ether, and water below 18.7 °C (Merck, 1983).

Physical Properties of Triethylamine

Synonyms: N,N-diethylethanamine; (diethylamino)ethane

Molecular Weight:	101.19
Boiling Point:	89.5 °C
Melting Point:	-115 °C
Flash Point:	-6.7 °C (20 °F) closed cup
Vapor Density:	3.48 (air = 1)
Density/Specific Gravity:	0.7255 at 25/4 °C (water = 1)
Vapor Pressure:	57.07 mm Hg at 25 °C
Log Octanol/Water Partition Coefficient:	1.45
Water Solubility:	55,000 mg/L at 25 °C
Henry's Law Constant:	1.38 x 10 ⁻⁴ at 25 °C
Conversion Factor:	1 ppm = 4.14 mg/m ³

(Howard, 1990; HSDB 1991; Merck 1989; Sax 1987; Sax 1989; U.S. EPA, 1994a)

SOURCES AND EMISSIONS

A. Sources

Sources of triethylamine include emissions and effluents where it is produced and used as a catalytic solvent in chemical synthesis, accelerator activator for rubber, corrosion inhibitor, curing and hardening agent for polymers, propellant, in the manufacture of quaternary ammonium compounds, in the desalination of seawater, and in sewage treatment plants (Merck, 1989). The primary stationary sources that have reported emissions of triethylamine in California are manufacturers of textile mill products, manufacturers of fabricated metal

products, and manufacturers of household appliances (ARB, 1997b).

B. Emissions

The total emissions of triethylamine from stationary sources in California are estimated to be at least 300 pounds per year, based on data obtained from the Air Toxics “Hot Spots” Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

Triethylamine occurs naturally in some food and as a metabolic product (Howard, 1990).

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of triethylamine. However, the United States Environmental Protection Agency (U.S. EPA) has reported ambient air concentrations of triethylamine as high as 4.2 micrograms per cubic meter or 1 part per billion from an unspecified location in the Northeast United States during 1983 (U.S. EPA, 1993a).

INDOOR SOURCES AND CONCENTRATIONS

No information about the indoor sources and concentrations of triethylamine was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

Triethylamine exists in the atmosphere in the gas phase. The dominant tropospheric loss process for triethylamine is by reaction with the hydroxyl (OH) radical, although reaction with gaseous nitric acid may be important in polluted urban areas (to form the nitrate salt). Using the measured rate constant for the reaction of trimethylamine (Atkinson, 1994), the calculated half-life and lifetime of triethylamine due to reaction with the OH radical is estimated to be 4 hours and 6 hours, respectively (Atkinson, 1995).

AB 2588 RISK ASSESSMENT INFORMATION

Triethylamine emissions are not reported from stationary sources in California under the AB 2588 program. It is also not listed in the California Air Pollution Control Officers Association Air Toxics “Hot Spots” Program Revised 1992 Risk Assessment Guidelines as having health values (cancer or non-cancer) for use in risk assessments (CAPCOA, 1993).

HEALTH EFFECTS

Probable routes of human exposure to triethylamine are inhalation, ingestion, and dermal contact (Howard, 1990).

Non-Cancer: Triethylamine is highly irritating. Exposure to triethylamine may cause skin, eyes, nose, throat, and respiratory tract irritation. Acute exposure to triethylamine vapors may cause corneal swelling and halo vision. High doses in animals cause heart, liver, and kidney injury. Central nervous system stimulation may possibly result from inhibition of monoamine oxidase (U.S. EPA, 1994a).

The U.S. EPA has established a Reference Concentration (RfC) of 0.007 milligrams per cubic meter for triethylamine based on inflammation of the nasal passages in rats. The U.S. EPA estimates that inhalation of this concentration or less, over a lifetime, would not likely result in the occurrence of chronic non-cancer effects. The U.S. EPA has not established an oral Reference Dose (RfD) (U.S. EPA, 1994a).

No information is available on adverse developmental or reproductive effects of triethylamine in humans or animals (U.S. EPA, 1994a).

Cancer: No information is available on the carcinogenic effects of triethylamine in humans or animals. The International Agency for Research on Cancer and the U.S. EPA have not classified triethylamine with respect to carcinogenicity (IARC, 1987a; U.S. EPA, 1994a).

